Claims

1. A drug carrier composition comprising
i) one or more biodegradable hydrating ceramics
ii) one or more expandable agents, and
iii) sorbed aqueous medium
which in solid form has a ruptured structure.

2. A drug carrier composition according to claim 1, which in solid form has a foam-like structure with openings, wherein at least 50% or more have a largest width of at least about 0.1 mm.

3. A drug carrier composition according to claim 2, wherein, in solid form, at least 60% such as, e.g., at least 70%, at least 75%, at least 80%, at least 85% or at least 90% of the openings have a largest width of at least about 0.1 mm.

4. A drug carrier composition according to any of claims 2-3, wherein the openings have a largest width of at least about 0.2 mm such as, e.g. at least about 0.3 mm, at least about 0.4 mm, at least about 0.5 mm.

5. A drug carrier composition according to any of claims 2-4, wherein the openings have a largest width of at least about 0.6 mm such as, e.g. at least about 0.8 mm, at least about 1.0 mm, or from about 0.1 mm to about 2 mm such as, e.g., from about 0.3 mm to about 1.5 mm or from about 0.5 mm to about 1.5 mm.

6. A drug carrier composition according to any of claims 2-5, wherein the surface area of an opening in cross sectional view having a largest width of at least about 0.1 mm is at least about 3 $x10^{-8}$ m^2 such as, e.g. at least about 5 $x10^{-8}$ m^2, at least about 1 $x10^{-7}$ m^2, at least about 5 $x10^{-7}$ m^2, at least about 1 $x10^{-6}$ m^2, or about 5 $x10^{-6}$ m^2 or more.

7. A drug carrier composition according to claim 1, which in solid form has a ruptured structure obtained by disintegration into two or more parts.

8. A drug carrier composition according to claim 7, wherein the two or more parts have an external surface area that is at least about twice as large as that of the composition before disintegration such as, e.g. at least about ten times as large, at least about a hundred times as large, or about a thousand times as large or more.

9. A drug carrier composition according to any of the preceding claims, wherein the biodegradable hydrating ceramic is selected from the group consisting of non-hydrated or hydrated calcium sulphate, calcium phosphate, calcium carbonate, calcium fluoride, calcium silicate, magnesium sulphate, magnesium phosphate, magnesium carbonate, magnesium fluoride, magnesium silicate, barium sulphate, barium phosphate, barium carbonate, barium fluoride, barium silicate, or mixtures thereof.

10. A drug carrier composition according to any of the preceding claims, wherein the biodegradable hydrating ceramic is non-hydrated or hydrated calcium sulphate.

11. A drug carrier composition according to any of the preceding claims, wherein the biodegradable hydrating ceramic employed in the preparation of the carrier composition is in the form of a powder.

12. A drug carrier composition according to claim 11, wherein the powder has a mean particle size of at the most about 75 μm such as, e.g., at the most about 50 μm, at the most about 25 μm or at the most about 10 μm.

13. A drug carrier composition according to any of the preceding claims, wherein the expandable agent is a gas-forming agent, a swelling agent, a gelling agent or a disintegrant.

14. A drug carrier composition according to claim 13, wherein the expandable agent is a gas-forming agent such as, e.g., alkali metal carbonates including sodium carbonate and potassium carbonates; alkali metal hydrogen carbonates including sodium hydrogen carbonate and potassium hydrogen carbonate; and hydrogen peroxide.

15. A drug carrier composition according to claim 13, wherein the expandable agent is a swelling agent, a gelling agent or a disintegrant such as, e.g., alginic acid, alginates, cellulose and cellulose derivatives including calcium carboxymethylcellulose, sodium carboxymethylcellulose, crospovidone, hydroxypropylcellulose, hydroxypropylmethylcellulose (HPMC), low substituted hydroxypropylcellulose (L-HPC), microcrystalline cellulose, pectins, polyethylene glycols, polyethylene oxides, polyvinylpyrrolidone, polyvinylpyrrolidone, starches including corn starch, rice starch, potato starch, and mixtures thereof.

16. A drug carrier composition according to any of the preceding claims, wherein the concentration of the expandable agent in the composition is at least about 0.1% w/w such as, e.g., at least about 0.2% w/w, at least about 0.3% w/w, at least about 0.4% w/w or at least about 0.5% w/w or from about 0.1% to about 10% w/w such as, e.g., from about 0.1% to about 5% w/w, from about 0.1% to about 2.5% w/w or from about 0.1% to about 1% w/w.

17. A drug carrier composition according to any of the preceding claims, wherein the concentration of sorbed aqueous medium is at the most about 60% w/w such as, e.g., at the most about 50% w/w, at the most about 45% w/w, at the most about 40% w/w or at the most about 30% w/w of the total composition.

18. A drug carrier composition according to any of claims 1-17 in liquid, semi-solid or solid form.

19. A drug carrier composition according to claim 18 in the form of a paste or another semi-solid form.

20. A drug carrier composition according to any of the preceding claims having a shape like e.g. beads, pellets, tubes, polygons, spheres, stars, cubes, etc.

21. A drug carrier composition according to any of the preceding claims further comprising one or more therapeutically, prophylactically and/or diagnostically active substances.

22. A drug carrier composition according to claim 21, wherein the active substance is homogeneously dispersed in the biodegradable hydrating ceramic.

23. A drug carrier composition according to any of the preceding claims, wherein the one or more biodegradable hydrating ceramics and the expandable agent are homogeneously dispersed in water so that the hydrating ceramic and/or the expandable agent sorbs water.

24. A drug carrier composition according to any of the preceding claims, which solidifies after a suitable time period of about 20 min or less such as, e.g. about 15 min or less, about 10 min or less or about 5 min or less when stored at 37°C.

25. A pharmaceutical composition comprising
i) one or more biodegradable hydrating ceramics
ii) one or more expandable agents,
iii) sorbed aqueous medium, and
iv) one or more therapeutically, prophylactically and/or diagnostically active substances,
which in solid form has a ruptured structure.

26. A drug carrier composition according to claim 25, which in solid form has a foam-like structure with openings, wherein at least 50% or more have a largest width of at least about 0.1 mm.

27. A pharmaceutical composition according to claim 25, wherein, in solid form, has at least 60% such as, e.g., at least 70%, at least 75%, at least 80%, at least 85% or at least 90% of the openings have a largest width of at least about 0.1 mm.

28. A pharmaceutical composition according to any of claims 25-27, wherein the openings have a largest width of at least about 0.2 mm such as, e.g. at least about 0.3 mm, at least about 0.4 mm, at least about 0.5 mm.

29. A pharmaceutical composition according to any of claims 25-28, wherein the openings have a largest width of at least about 0.6 mm such as, e.g. at least about 0.8 mm, at least about 1.0 mm, or from about 0.1 mm to about 2 mm such as, e.g., from about 0.3 mm to about 1.5 mm or from about 0.5 mm to about 1.5 mm.

30. A pharmaceutical composition according to claim 25, wherein the surface area of an opening in cross sectional view having a largest width of at least about 0.1 mm is at least about 3×10^{-8} m^2 such as, e.g. at least about 5×10^{-8} m^2, at least 1×10^{-7} m^2, at least about 5×10^{-7} m^2, at least about 1×10^{-6} m^2, or about 5×10^{-6} m^2 or more.

31. A pharmaceutical composition according to claim 25, which in solid form has a ruptured structure obtained by disintegration into two or more parts.

32. A drug carrier composition according to claim 31, wherein the two or more parts have an external surface area that is at least about twice as large as that of the composition before disintegration such as, e.g. at least about ten times as large, at least about a hundred times as large, or about a thousand times as large or more.

33. A pharmaceutical composition according to any of claims 25-32, wherein the biodegradable hydrating ceramic is selected from the group consisting of non-hydrated or hydrated calcium sulphate, calcium phosphate, calcium carbonate, calcium fluoride, calcium silicate, magnesium sulphate, magnesium phosphate, magnesium carbonate, magnesium fluoride, magnesium silicate, barium sulphate, barium phosphate, barium carbonate, barium fluoride, barium silicate, or mixtures thereof.

34. A pharmaceutical composition according to any of claims 24-33, wherein the biodegradable hydrating ceramic is non-hydrated or hydrated calcium sulphate.

35. A pharmaceutical composition according to any of claims 25-34, wherein the biodegradable hydrating ceramic employed in the preparation of the composition is in the form of a powder.

36. A pharmaceutical composition according to claim 35, wherein the powder has a mean particle size of at the most about 75 μm such as, e.g., at the most about 50 μm, at the most about 25 μm or at the most about 10 μm.

37. A pharmaceutical composition according to any of claims 25-36, wherein the expandable agent is a gas-forming agent, a swelling agent, a gelling agent or a disintegrant.

38. A pharmaceutical composition according to claim 37, wherein the expandable agent is a gas-forming agent such as, e.g., alkali metal carbonates including sodium carbonate and potassium carbonates; alkali metal hydrogen carbonates including sodium hydrogen carbonate and potassium hydrogen carbonate; and hydrogen peroxide.

39. A pharmaceutical composition according to claim 37, wherein the expandable agent is a swelling agent, a gelling agent or a disintegrant as, e.g., alginic acid,

alginates, cellulose and cellulose derivatives including calcium carboxymethylcellulose, sodium carboxymethylcellulose, crospovidone, hydroxypropylcellulose, hydroxypropylmethylcellulose (HPMC), low substituted hydroxypropylcellulose (L-HPC), microcrystalline cellulose, pectins, polyethylene glycols, polyethylene oxides, polyvinylpyrrolidone, starches including corn starch, rice starch, potato starch, and mixtures thereof.

40. A pharmaceutical composition according to any of claims 25-39, wherein the concentration of the expandable agent in the composition is at least about 0.1% w/w such as, e.g., at least about 0.2% w/w, at least about 0.3% w/w, at least about 0.4% w/w or at least about 0.5% w/w or from about 0.1% to about 10% w/w such as, e.g., from about 0.1% to about 5% w/w, from about 0.1% to about 2.5% w/w or from about 0.1% to about 1% w/w.

41. A pharmaceutical composition according to any of claims 25-40, wherein the concentration of sorbed aqueous medium is at the most about 60% w/w such as, e.g., at the most about 50% w/w, at the most about 45% w/w, at the most about 40% w/w or at the most about 30% w/w of the total composition.

42. A pharmaceutical composition according to any of claims 25-41 in liquid, semi-solid or solid form.

43. A pharmaceutical composition according to claim 42 in the form of a paste or another semi-solid form.

44. A pharmaceutical composition according to any of claims 25-43 having a shape like e.g. beads, pellets, tubes, polygons, spheres, stars, cubes, etc.

45. A pharmaceutical composition according to any of claims 25-44, wherein the therapeutically, prophylactically and/or diagnostically active substance is an anti-cancer agent.

46. A pharmaceutical composition according to claim 45, wherein the anti-cancer agent is an androgen or a derivative thereof, an anti-androgen or a derivative thereof, an oestrogen or a derivative thereof, an anti-oestrogen or a derivative thereof, a gestagen or a derivative thereof, an anti-gestagen or a derivative thereof, an oligonucleotide, a

progestagen or a derivative thereof, a gonadotropin-releasing hormone or an analogeu or derivative thereof, a gonadotropin inhibitor or a derivative thereof, an adrenal and/or prostate enzyme inhibitor, a membrane efflux and/or membrane transport protein, an immune system modulator, an angiogenesis inhibitor, or combinations thereof.

47. A pharmaceutical composition according to claim 46, wherein the anti-androgen is flutamide, hydroxy-flutamide, cyproteron, nilutamide or bicalutamide or the like.

48. A pharmaceutical composition according to claim 45, wherein the anti-cancer agent is a combination of an anti-androgen and a gonadotropin-releasing hormone or an analogue thereof.

49. A pharmaceutical composition according to any of claims 25-48, wherein the active substance is homogeneously dispersed in the biodegradable hydrating ceramic.

50. A pharmaceutical composition according to any of claims 25-49 for parenteral use.

51. A pharmaceutical composition according to any of claims 25-50, wherein the one or more biodegradable hydrating ceramics, the expandable agent and the one or more active substance are homogeneously dispersed in water so that the hydrating ceramic, the expandable agent and/or the active substance sorbs water.

52. A pharmaceutical composition according to any of claims 25-51, which solidifies after a suitable time period of about 20 min or less such as, e.g. about 15 min or less, about 10 min or less or about 5 min or less when stored at 37°C.

53. A pharmaceutical composition according to any of claims 25-52, wherein the one or more biodegradable hydrating ceramics have a microporous structure.

54. A pharmaceutical composition according to claim 53, wherein at least part of the microporous structures is sealed with a pore-sealing agent.

55. A pharmaceutical composition according to claim 53 or 54, wherein at least 50% such as, e.g., 60% or more, 70% or more, 80% or more or 90% or more of the microporous structures is sealed with a pore-sealing agent.

56. A pharmaceutical composition according to claim 54 or 55, wherein the pore-sealing agent is a hydrophobic agent, a hydrophilic agent or a water-absorbing agent.

57. A pharmaceutical composition according to claim 56, wherein the hydrophobic agent is selected from the group consisting of silicone oil, silicon rubber, waxes, paraffinic hydrocarbons, polyvinylalcohols and ethyl cellulose.

58. A pharmaceutical composition according to claim 56, wherein the hydrophilic agent is selected from the group consisting of methylcellulose, hyaluronic acid, dextran and poly-ethylene glycol (PEG).

59. A pharmaceutical composition according to claim 56, wherein the water- absorbing agent is selected from the group consisting of water glasses, silica gel and sodium phosphate.

60. A pharmaceutical composition according to any of claims 54-59, wherein the concentration of the pore-sealing agent in the composition is about 30% w/w or less such as, e.g., about 25% w/w or less or about 20% or less in the final composition.

61. A pharmaceutical composition according to any of claims 25-60, wherein the active substance is controlled released from the composition.

62. A pharmaceutical composition according to claim 61, wherein at the most about 10% w/w of the active substance contained in the composition is released 5 days or more after implantation to a human.

63. A pharmaceutical composition according to claim 61 or 62, wherein at the most about 50% w/w of the active substance contained in the composition is released 1 month or more after implantation to a human.

64. A pharmaceutical composition according to any of claims 61-63, wherein at the most about 75% w/w of the active substance contained in the composition is released 1.5 month or more such as, e.g., 2 month or more after implantation to a human.

65. A pharmaceutical composition according to any of claims 61-64, wherein at the most about 100% w/w of the active substance contained in the composition is released

2 month or more such as 2.5 month or more or 3 month or more after implantation to a human.

66. A pharmaceutical composition according to claim 61, wherein at the most about 10% w/w of the active substance contained in the composition is released after 2 days or more – when tested in an *in vitro* dissolution test according to Ph.Eur. (paddle).

67. A pharmaceutical composition according to claim 61 or 66, wherein at the most about 50% w/w of the active substance contained in the composition is released after 1 month or more – when tested in an *in vitro* dissolution test according to Ph.Eur. (paddle).

68. A pharmaceutical composition according to any of claims 61, 66-67, wherein at the most about 75% w/w of the active substance contained in the composition is released after 1.5 month or more such as, e.g., 2 month or more – when tested in an *in vitro* dissolution test according to Ph.Eur. (paddle).

69. A pharmaceutical composition according to any of claims 61, 66-68, wherein at the most about 100% w/w of the active substance contained in the composition is released after 2 month or more such as 2.5 month or more or 3 month or more – when tested in an in vitro dissolution test according to Ph.Eur. (paddle).

70. A composition in particulate form for use in the preparation of a drug carrier composition as defined in any of claims 1-24 or a pharmaceutical composition as defined in any of claims 25-69, the composition comprising
i) one or more biodegradable hydrating ceramics in powder form
ii) one or more expandable agents, and
iii) optionally, one or more therapeutically, prophylactically and/or diagnostically active substances.

71. A method for the preparation of a pharmaceutical composition as defined in any of claims 25-69, which method comprises dispersing a mixture of
i) one or more biodegradable hydrating ceramics in powder form, and
ii) one or more expandable agents,
in
iii) an aqueous medium,

wherein either the mixture of i) and ii), or iii) further comprises
iv) one or more therapeutically, prophylactically and/or diagnostically active substances.

72. A method according to claim 70, wherein the pharmaceutical composition is an injectable and *in vivo* solidifying composition for controlled release of the active substance.